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BIOB 160N.00: Principles of Living Systems

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PRINCIPLES OF LIVING SYSTEMS (BIOB 160)

Fall Semester 2014

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Overview and Objectives

Biology encompasses a diverse set of disciplines that includes biochemistry, molecular and cell biology, genetics, evolutionary biology, ecology, behavior, ecosystem biology, conservation biology, human and veterinary medicine, agronomy and more. Knowledge of biology is also increasingly important in other disciplines, such as economics, politics, social policy, ethics, business, technology, engineering and design, and architecture. In fact, it is difficult to find any human activity for which an understanding of biology has not become relevant and important.

BIOB160N, *Principles of Living Systems*, is a broad survey course that is a pre-requisite for all options in the Biology and Wildlife majors, and is generally required for all pre-professional programs in the health sciences. In BIOB160N we will work to develop a strong foundation for your future studies in Cell and Molecular Biology, Genetics and Evolution, Developmental Biology, Anatomy and Physiology, Ecology, and related options.

The goals of BIOB160N are for you to:

- 1) grasp how science works (What is science? What is not science?);
- 2) learn how to construct *testable* questions, design experiments that test such questions, then interpret observational data that answer those questions;
- 3) learn how to communicate your ideas – *orally and in writing* – about the structure, function and evolution of living systems;
- 4) understand the basic physical and chemical properties that characterize living systems;
- 5) know the main types of molecules common to all living systems;
- 6) understand how energy is captured, stored, used, and passed through living systems;
- 7) understand how biological information is preserved, inherited and modified;
- 8) understand how stored biological information is unpacked to make biological machines;
- 9) understand how the processes of natural selection and evolution work;
- 10) understand some of the ways that humans affect biological processes on Earth.

Principles of Biology is a cumulative course, so that your success in grasping the material presented one week will depend on your having mastered material presented in previous weeks. It is essential for you to keep up with the readings and homework assignments. If you fall behind, it will be difficult to catch up. If you find yourself in trouble, please advise your professors and/or Graduate Teaching Assistants as EARLY as possible. We will be better able to help you if you talk with us as problems arise; we will be less sympathetic ten minutes before an exam. If you cannot meet at any of the designated office hours, please work to schedule an appointment at another time.

Learning is not a passive activity; in BIOB160 (and in all your coursework!) you need to take an active role. We are here to facilitate your learning, but we ask that you:

- ❖ Actively participate in the class meetings and labs
- ❖ Be prepared to work cooperatively in groups during class meetings and during the labs
- ❖ Take responsibility for coming prepared to class meetings and labs
- ❖ Reflect objectively on your own progress and understanding

Course Schedule

In addition to material we cover in lectures, you will be responsible for readings indicated below.

Textbook: *Campbell Biology, 10th edition [it's OK to use the 9th edition if you have that, but make sure you read the correct chapters & pages]*

| <i>Week of</i> | <i>Prof.</i> | <i>Topic</i> | <i>Reading from Text</i> | <i>Lab Activity</i> |
|----------------|--------------|--|--------------------------|---|
| Aug 25 | AW | Introduction and Overview Natural Selection - Domestication | Chap. 1 | No labs |
| Sept 1 | AW | <i>No class Monday (Labor Day)</i> What is Science? Flies and spiders. Natural Selection - Galapagos | Chap. 22 | What is Science? |
| Sept 8 | AW | Ecology and the Biosphere | Chap. 52 | What is Science II? The Tasmanian Wolf |
| Sept 15 | AW | Chemistry of Life | Chap. 2 | Biomimicry Bingo |
| Sept 22 | AW | What's so special about water? | Chap. 3 | Water |
| Sept 29 | AW | <i>Monday, Sept 29– Test 1</i> What's so special about carbon? | Chap. 4 | Poster Instructions |
| Oct 6 | SM | Biological Molecules: Carbohydrates and Lipids | Chap. 5 pp. 66 - 75 | Soap I |
| Oct 13 | AW | Biological Molecules: Proteins and Nucleic Acids | Chap. 5 pp. 75 - 89 | Soap II |
| Oct 20 | AW/SM | Energy and Metabolism | Chap. 8 | Protein Structure |
| Oct 27 | SM | Cells: Windows on life's unity and diversity <i>Friday, Oct 31– Test 2</i> | Chap. 6 | Prep time for posters |
| Nov 3 | SM | Cellular Respiration | Chap. 9 | No labs |
| Nov 10 | SM | Eating light: Photosynthesis | Chap. 10 | No labs |
| Nov 17 | SM | What's the dream of every cell? Mitosis and Meiosis | Chap. 12 & 13 | Poster symposium |
| Nov 24 | SM | A most selfish molecule: DNA Replication (M only) <i>No class W and F (Thanksgiving)</i> | Chap. 16 & 17 | No labs |
| Dec 1 | SM | DNA Replication and Central Dogma | | DNA extraction |
| Dec 9 | | <i>Final Exam – Tuesday, December 9, 1:10 – 3:10</i> | | |

Grading

Grades in this course will be assigned in the +/- system. Your grade will be based on the following:

| | |
|--------------------------------|------------|
| Exam 1 | 15% |
| Exam 2 | 15% |
| Final Exam | 15% |
| Mastering Biology Assignments* | 15% |
| Labs | <u>40%</u> |
| | 100 |

*The lowest two scores for your Mastering Biology Assignments will be dropped.

Exams

You will take two 50-minute exams and one 2-hour Comprehensive Final, all of equal value, each scaled to 15 points. Each exam will consist of multiple-choice and matching questions whose answers will be recorded on electronically-graded Scantron forms (which you will have to bring). We will draw approximately 25% of your questions directly from the “Mastering Biology” assignments; the remainder will be drawn from the Campbell *Biology* test bank and from your instructors’ fertile imaginations. On exam days all you will need to bring to class are #2 pencils and, if you wish, a calculator. All electronic devices (except calculators) must be stowed and in the “off” position.

Make-up exams will be administered one week *after* the scheduled exam. Make-up exams will consist entirely of essay questions, and will include additional lecture material covered after the regularly scheduled exam. Students generally find make-ups to be more difficult than the regularly scheduled exam. Only students presenting verifiable medical or university excuses directly to Dr. Woods or Dr. Miller at least 24 hours before the regularly scheduled exam will be eligible for a make-up exam.

Mastering Biology Homework Assignments

In order to complete your homework assignments, you must have a Mastering Biology account administered by the Campbell’s publisher, Pearson. Mastering Biology is an online resource that will give you practice with the material that we cover in class and in your readings. You will have regular assignments (5 or 6 during the semester) to do on this site. In addition, a significant fraction (~25%) of the questions on your in-class exams and final exam will be taken directly from the Mastering Biology assignments. To sign up for an account, you’ll need an access code. If you bought your textbook from the UM Bookstore, it will come bundled with the code. If you got your book by some other outlet (e.g., Amazon), it may not have a code associated with it. If not, you will need to purchase an access code at www.masteringbio.com/site/register/new-students.html. When you are registering for Mastering Biology, you will need to specify that you use Campbell 10e (college edition). The course ID for this class is: BIOB160F14.

Course Teaching Assistants (TAs) & Labs

There are nine TAs for BIOB 160 this semester:

Andrew Boyce (andrew1.boyce@umontana.edu)
Zach Clare-Salzler (zclaresalzler@gmail.com)
Ryan Hegstad (rjhegstad@gmail.com)
Steve Lane (Steven.Lane@umconnect.umt.edu)
Jacob Lucero (jacob.lucero@umontana.edu)
Devin O’Brien (devin.obrien@umontana.edu)
Gerard Sapes (gerard.sapes@mso.umt.edu)
Derek Spitz (derek1.spitz@umontana.edu)
Jeff Strait (jeffrey1.strait@umontana.edu)

You will meet your TA at the first lab meeting, which will start the second week of classes (week of September 2). Your TA will be an essential resource for this class, and he or she should be your first point of contact when you have questions, either about the course structure or about particular ideas and concepts with which you may be having trouble.

The labs provide different ways to get hands-on experience with the concepts discussed in class. The labs are also critically important to your grade—because they make up 40% of the total available points. Altogether there are eight grade-able events (7 actual labs and one poster symposium), meaning that each one is worth 5 points. In general, lab write-ups will be due one week after the lab meets for an activity.

The write-ups will consist of a series of questions, observations, and hypotheses that you formulate during the lab.

Research project and symposium

Your final lab project is an exciting opportunity to perform your own biological experiment. Working in groups of 3-4, you will identify a pattern or question that interests your group, develop your own hypotheses and predictions to try to explain the pattern, then design methods for a simple experiment that tests whether these predictions are valid. Your projects need to be simple enough to carry out in a relatively short time. Your group will present your project to the rest of the class in a short scientific presentation. The week of Oct 7 you will receive detailed instructions and guidelines about this project as well as examples of simple, but interesting questions researched by BIO160 students in the past.

Course Material

You will be able to access many of the resources for this class on the course Moodle site. We will post copies of the PowerPoint lectures, labs, as well as other information. You can access these materials through login.umt.edu. You will need your NetID and password for these. If you forgot what these are you can get more information from <https://user.umt.edu/netidlookup/>.

The official textbook for BIOB160 is Campbell Biology, 10th ed., which is available at the UM Bookstore (<http://www.montanabookstore.com/>). We will keep several copies of it on 3-hour reserve at the University of Montana Library.

Extra credit —none offered.

Students with disabilities

The University of Montana assures equal access to instruction through collaboration between students with disabilities, instructors, and Disability Services for Students (DSS). If you think you may have a disability adversely affecting your academic performance, and you have not already registered with DSS, please contact DSS in Lommasson 154. We are happy to work with you and DSS to provide appropriate accommodations for your learning and testing. For example, lectures will be recorded. Students with disabilities and/or students who have had to miss class due to documented illness or participation in University-sanctioned activities may request to listen to these via iTunes. For more information, please consult <http://life.umt.edu/dss/>.

Computers

The Division of Biological Sciences maintains a computer lab that is dedicated for use in biology courses. It is located in Health Sciences 114. You need to have an account to use the computers, software, and printers. There are good black & white and color printers in the HS114 computer lab. If you don't already have an account, a lab monitor can help you set one up between 8 AM – 5 PM, Monday through Friday.

A Note on Email and Spam Filters

All email communication for the course will be sent to your official university email, and not to other email providers. If you don't normally check your university email you will miss important emails. You can have your university email forward messages to other email addresses (e.g., gmail, yahoo, etc). When we email the whole class the message will go to lots of email addresses, and some email providers will block this as spam. You will want to check the settings of your spam filters so that they allow such messages.

Plagiarism and Cheating

Although you will be encouraged to work collaboratively with others in this class and the lab, ***the work you hand in must be your own***. A good rule of thumb is that you can work together up to the point of committing words to paper (or computer). After that, the words you put down should be your own. We

remind you of the official University policy on plagiarism: "Plagiarism is the representing of another's work as one's own. It is a particularly intolerable offense in the academic community and is strictly forbidden. Students who plagiarize may fail the course and may be remanded to Academic Court for possible suspension or expulsion (See Student Conduct Code section of this catalog). Students must always be very careful to acknowledge any kind of borrowing that is included in their work. This means not only borrowed wording but also ideas. Acknowledgment of whatever is not one's own original work is the proper and honest use of sources. Failure to acknowledge whatever is not one's own original work is plagiarism." (Quotation from The University of Montana Catalog).

If you have any questions about the line between collaboration and plagiarism, see your professors or your TA before you hand in material. Assignments from two or more students that have significant overlap will be regarded as reflecting a violation of the expectation that students turn in independent work. All the students involved will be given no points for that material, and the violation will be dealt with according to the Student Conduct Code. Penalties for plagiarism and cheating can be as severe as suspension or expulsion from The University. For more information on the official UM policies on plagiarism and the Student Conduct Code you can refer to: http://life.umt.edu/vpsa/student_conduct.php.

Adds, drops, and changes of grading

University policies on drops, adds, changes of grade option, or change to audit status will be strictly enforced in BIOB160N. These policies are described in the 2014-15 UM course catalogue, <http://www.umt.edu/catalog/academics/academic-policy-procedure.php>.

Classroom Behavior

You must conduct yourself as a responsible, courteous adult. **Disruptive or distracting behavior such as talking, sending or receiving cell phone messages, including text messages, reading the newspaper, and eating, will not be permitted.** Anyone engaged in any of these disruptive behaviors will be dismissed from class. The second such offense will result in dismissal from BIOB160N with a grade of F.